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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,025	09/13/2001	Wing L. Sung	07121.0001U1	2247

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NEEDLE & ROSENBERG, P.C.
SUITE 1000
999 PEACHTREE STREET
ATLANTA, GA 30309-3915

EXAMINER

RAO, MANJUNATH N

ART UNIT	PAPER NUMBER
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1652

DATE MAILED: 09/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/856,025

Applicant(s)

SUNG ET AL.

Examiner

Manjunath N. Rao, Ph.D.

Art Unit

1652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2004 and 14 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 18-28 is/are pending in the application.
- 4a) Of the above claim(s) 23-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 is/are rejected.
- 7) ☒ Claim(s) 18-22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 1652

DETAILED ACTION

Claims 1, 18-28 are currently pending and are present for examination. Claims 1 and 18-22 are now under consideration. Claims 23-28 remain withdrawn from consideration being drawn to non-elected invention.

Applicants' amendments and arguments filed on 10-31-03 and 6-14-04, have been fully considered and are deemed to be persuasive to overcome the rejections previously applied. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. Specifically Examiner has withdrawn all the previous rejections under 35 U.S.C. 112, , 1st and 2nd paragraph in view of claim amendments and cancellations. Examiner has also withdrawn the previous rejection under 35 U.S.C. 102(b) in view of claim amendments. However, new rejections are in place.

Sequence Compliance

Examiner acknowledges, applicant's submission of sequence listing. The sequences have been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1652

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakarchuk et al. (Prot. Eng., 1994, Vol. 741 1): 1379-1386, cited in IDS) and Sung (a) et al. (US 5759840, 6-2-1998) or Sung (b) et al. (US 5866408, 2-2-1999). Claim 1 in this instant application is drawn to an isolated, modified, Family 11 xylanase comprising at least one intramolecular disulfide bond and a basic amino acid at position 162, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16, said modified xylanase exhibiting at least 40% of optimal activity from about pH 3.5 to about pH 6.0, and from about 40 to about 60 degree C, said modified xylanase being thermostable.

Wakarchuk et al. disclose that introduction of disulfide bonds in family 11, xylanase isolated from *B.circulans* increases the thermostable characteristics. While the reference does not exactly recite the identical thermostable characteristics as claimed in the instant claims, it does disclose improved thermostable characteristics. The reference also describes methods that can be used to introduce the di-sulfide bonds.

The references of Sung et al. each disclose a xylanase wherein the amino acid at position 162 already comprises a basic amino acid (see enclosed sequence alignment). However, the reference does not teach the introduction of di-sulfide bridges in those specific sequences. The reference thus provides a xylanase enzyme having a sequence in which the amino acid at position 162 is a basic amino acid when determined from sequence alignment with SEQ ID NO:16, which satisfies said limitation.

With the above two references in hand it would have been obvious to those skilled in the art to arrive at a modified family 11 xylanase comprising at least a single di-sulfide bond and a

Art Unit: 1652

basic amino acid at position 162. Such an enzyme when once made would inherently have the increased thermostable and alkilophilic characteristics because of the structure. One of ordinary skill in the art would be motivated to do so as the reference of Wakarchuk et al. disclose that creating a di-sulfide bridge increases the thermostability of the enzyme which has largely industrial applications and the reference of Sung et al. provide the required xylanase enzyme. One of ordinary skill in the art would have a reasonable expectation of success since Wakarchuk et al. demonstrate the increase in thermostability by introduction of di-sulfide bridges and Sung et al. provide a number of xylanase sequences also for modification purposes.

Therefore the claimed invention would have been *prima facie* obvious to one of ordinary skill in the art.

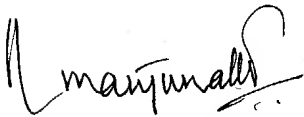
This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1652

Conclusion

Claims 18-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Manjunath N. Rao, Ph.D. whose telephone number is 571-272-0939. The Examiner can normally be reached on 7.00 a.m. to 3.30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Ponnathapura Achutamurthy can be reached on 571-272-0928. The fax phone numbers for the organization where this application or proceeding is assigned is 703-872-9306 for regular communications and for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1600.



Manjunath N. Rao, Ph.D.
Primary Examiner
Art Unit 1652

September 1, 2004